CLAIMS

1. A graph walking system, comprising:

a binding system for binding a graph observer with a data graph, for binding node patterns to node observers to generate at least one node pattern/node observer pair, and for binding the data graph observer to at least one node pattern/node observer pairing, and wherein each node pattern includes a computed set of target sub-node patterns;

a node relationship graph (NRG), wherein each node in the NRG corresponds to at least one node in the data graph, and wherein each node in the NRG includes a computed set of valid sub-node patterns;

graph walking logic for systematically walking through nodes in the data graph and corresponding nodes in the NRG; and

a pattern testing system that determines if the set of target sub-node patterns for a node pattern matches the set of valid sub-node patterns for a corresponding NRG node when a node is encountered in the data graph.

2. The graph walking system of claim 1, wherein the set of target sub-node patterns includes at least one generational node pattern.

3. The graph walking system of claim 1, further comprising a graph observer pruning system for deactivating a graph observer for sub-node processing when no matches occur between target sub-node patterns and valid sub-node patterns for an encountered node.

4. The graph walking system of claim 3, wherein the graph walking logic includes a sub-node pruning system for disabling the graph walking logic when all graph observers for a set of sub-node have been deactivated.

5. The graph walking system of claim 1, wherein the graph walking logic stores a list of node pattern/node observer pairs corresponding to matches made by the pattern testing system for each node.

6. The graph walking system of claim 5, wherein, for a root node, the pattern testing system tests each target sub-node pattern for all node patterns bound the graph observer, and adds a corresponding node pattern/node observer pair to the list of corresponding node pattern/node observer pairs for the root node.

7. The graph walking system of claim 5, wherein, for a child node, the pattern testing system tests each target sub-node pattern associated with the list of node pattern/node observer pairs stored for a parent node.

8. The graph walking system of claim 7, wherein the pattern testing system adds a corresponding node pattern/node observer pair to the list of corresponding node pattern/node observer pairs for the child node when a match occurs.

9. A system for optimizing a graph walking process of an inputted data graph based on inputted node patterns and a node relationship graph (NRG) that corresponds to the inputted data graph, the system comprising:

a system for generating a set of valid sub-node patterns for each node in the NRG;

a system for generating a set of target sub-node patterns for each inputted node pattern;

a graph processor for systematically walking through nodes within the data graph and corresponding nodes in the NRG; and

a pattern testing system that determines if the target sub-node patterns for a node pattern match the valid sub-node patterns for a corresponding node in the NRG when a node is encountered in the data graph.

10. The system of claim 9, further comprising a first pruning system that can be instructed by a node observer bound with an associated graph observer to deactivate the associated graph observer for a set of sub-nodes when no matches occur between target sub-node patterns and valid sub-node patterns.

11. The system of claim 10, further comprising a second pruning system that can instruct the graph processor not to walk the set of sub-nodes if all graph observers have been deactivated.

12. The system of claim 9, wherein the graph processor includes a root node test, wherein the root node test tests all target sub-node patterns.

13. The system of claim 9, wherein the graph processor includes a child node test, wherein the child node test tests only target sub-node patterns associated with node patterns that had at least one match in a parent node.

14. A method for analyzing a graph of hierarchical data, comprising the steps of:

binding a plurality of graph observers to the graph, wherein each graph observer is further bound to a set of inputted node patterns and a set of inputted node observers;

computing a set of target sub-node patterns for each inputted node pattern;

providing a node relationship graph (NRG) for the graph, wherein each node in the NRG corresponds to a node in the graph;

computing a set of valid sub-node patterns for each node in the NRG;

systematically walking through nodes within the graph;

testing to determine if the target sub-node patterns for a node pattern matches the valid sub-node patterns for a corresponding NRG node when a node is encountered in the graph; and

deactivating an identified graph observer for sub-nodes of an encountered node if none of the target sub-node patterns associated with node patterns bound to the identified graph observer match valid sub-node patterns.

15. The method of claim 14, comprising the further step of reactivating the identified graph observer after the sub-nodes of the encountered node have been walked.

16. A program product stored on a recordable medium, which when executed, optimizes a graph walking process of an inputted data graph based on inputted node patterns and a node relationship graph (NRG) that corresponds to the inputted data graph, the program product comprising:

means for generating a set of valid sub-node patterns for each node in the NRG;

means for generating a set of target sub-node patterns for each inputted node pattern;

means for systematically walking through nodes within the data graph and corresponding nodes in the NRG; and

means for determining if the target sub-node patterns for a node pattern match the valid sub-node patterns for a corresponding node in the NRG when a node is encountered in the data graph.

17. The program product of claim 16, further comprising a first pruning system that can be instructed by a node observer bound with an associated graph observer to deactivate the associated graph observer for a set of sub-nodes when no matches occur between target sub-node patterns and valid sub-node patterns.

18. The program product of claim 17, further comprising a second pruning system that can instruct the graph processor not to walk the set of sub-nodes if all graph observers have been deactivated.

19. The program product of claim 16, wherein the determining means includes a root node test, wherein the root node test tests all target sub-node patterns.

20. The program product of claim 16, wherein the determining means includes a child node test, wherein the child node test tests only target sub-node patterns associated with node patterns that had at least one match in a parent node.